Tissue engineering

Understanding how axons regenerate

Spinal cord injury, which often leads to severe disability, damages or destroys axons.

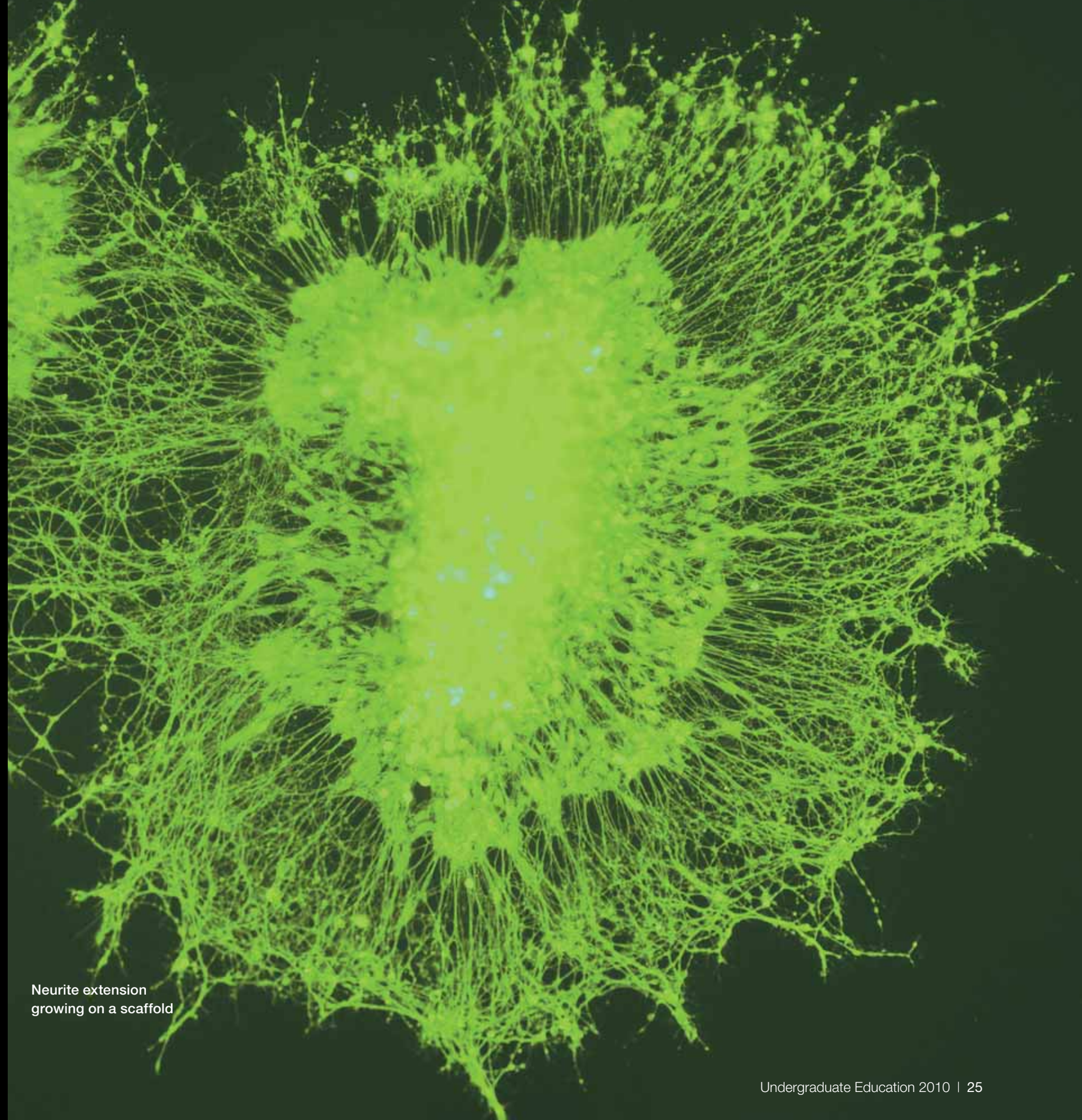
The long, slender projections of a nerve cell or neuron, axons conduct electrical impulses away from the neuron body.

Ryan Young is studying how axons regenerate in an effort to find a way to repair spinal cord injuries and allow paralyzed people to use their limbs again.

"Many approaches to studying human spinal cord injuries are used in laboratory research, but virtually every potential treatment is studied in vitro first," notes Young. A chemical engineering major, he has worked in the Regeneration and Repair lab for the past year placing dorsal root ganglia (DRG) onto fibers derived from poly-L-lactic acid. The highly-aligned fibers are easy to "climb" and serve as "scaffolding" to help direct the outgrowth of the DRG neurites, or developing neurons. The guidance structures assist regenerating neurons to grow, even through damaged tissue.

"The neurites are allowed to extend for several days," Young explains. "At that point we cut them, and examine their behavior under a microscope. By studying the regeneration patterns that take place after the cut, we hope to determine precisely when to apply therapeutics to injured neurons. It's rewarding to think that these experiments with dorsal root ganglia may someday lead to understanding neural response to physical damage."

Young works alongside advisor Ryan Gilbert, an assistant professor of biomedical engineering who focuses on spinal cord injury exclusively. Mike Mullins, a professor of chemical engineering, is also an advisor. They hope to create a standard in vitro model of how injured axons regenerate—one that could serve as a helpful tool for spinal cord researchers around the world.



Neurite extension growing on a scaffold